

Rheumatic Lesions in Left Atrial Appendages

Pathologic Studies of Material Removed During Mitral Commissurotomy

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THE REMOVAL of the left auricular appendage incidental to mitral commissurotomy has supplied, in a limited sense, a cardiac biopsy specimen from patients with chronic rheumatic heart disease. The limitations are both clinical and pathological. The source of material is a selected group of patients with mitral stenosis for whom the operative procedure was considered indicated, according to criteria which vary in different clinics. One important consideration here is that known recent or active rheumatic carditis is usually a contraindication to the surgical procedure.

The pathologic limitation is that, except for rare instances of diagnostic error, the auricular appendages are from hearts which are the seat of severe mitral stenosis. In this sense the material is fairly uniform. Unfortunately it is from a portion of the heart not routinely studied at autopsy, so that reference data on this area of the heart are meager.

A number of papers have appeared reporting the pathological observations in such auricular appendages and correlating these observations with clinical data in the patients concerned, and with pathological data in rheumatic heart disease. As might be expected in mitral stenosis the auricular appendages showed a high incidence of myocardial hypertrophy and fibrosis, endocardial fibrosis and mural thrombosis. The finding which had not been expected, presumably because of the selection of patients for operation, and which has excited the most interest, was the high incidence of Aschoff bodies. In a recent report on the significance of Aschoff bodies in the left atrial appendage, Thomas and co-workers⁶ tabulated the incidence of Aschoff bodies found in 469 atrial appendages reported in the literature, including 40 cases they had observed. The reported incidence varied from 16 per cent to 67 per cent and the average was 43 per cent.

Operation for mitral stenosis was performed on 204 patients at the Hospital of the Good Samaritan in Los Angeles during the period June 15, 1951, to April 16, 1954. The auricular appendage was avail-

• The left atrial appendage removed incidental to mitral valve commissurotomy was studied for rheumatic lesions in 128 cases. Endocardial Aschoff bodies, which are usually considered indicative of active rheumatic disease, were found in 35.9 per cent of the cases.

Postoperative follow-up observations were available in only 53 patients. Of these, only eight had clinical evidence of postoperative rheumatic activity. In none of this group of eight cases had Aschoff bodies been observed in pathologic study of the surgically removed left atrial appendage.

able for pathological study in 128 of these cases. The present report is based on this group of cases.*

CLINICAL DATA

There were 102 females and 26 males in the total group. This sex difference is much greater than the natural slight preponderance of mitral stenosis in females. The age of the patient at the time of operation varied from 24 to 59 and averaged 39.9 years.

Only 11 of the 128 patients were born in California. The geographical area of birth was as follows:

North Central states.....	39
Northeastern states	24
Rocky Mountain states.....	21
South Central states.....	16
California	11
Other Pacific Coast states.....	5
Southeastern states	2
Foreign born (Canada 4).....	10

Information as to the age of onset of rheumatic fever was available in 122 cases. In 61 it occurred before age 10, in 48 between 10 and 20 and in 12 after age 20. The date of last known rheumatic fever before mitral valve commissurotomy was known in 74 cases. It occurred more than five years before operation in 59 cases, two to five years before operation in 11 cases, and less than two years before in only four cases.

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Sedimentation rate (Wintrobe) was done in the immediate preoperative period on 118 patients. In 55 patients it was normal (under 6.5 mm. in one hour in males and under 15 mm. in females) and in 63 patients it was accelerated. The incidence of accelerated sedimentation rate was lower in the group of 46 patients who had Aschoff lesions (45.7 per cent) than in the group who did not have Aschoff lesions (56.8 per cent). Thus there was no correlation of accelerated sedimentation rate with presence of Aschoff bodies in the biopsy material. Similar observations were reported by McNeely and co-workers.³

Antistreptolysin titers were determined (method of Todd) before operation in only eight patients. They were elevated in six patients (over 50 Todd units). There was no correlation with occurrence of Aschoff bodies. None of this small group of patients showed Aschoff bodies. Increased antistreptolysin titer did correlate pretty well with elevated sedimentation rate.

PATHOLOGIC OBSERVATIONS

The auricular appendages were fixed in 10 per cent formalin and sectioned in routine fashion. There was no uniformity of method as to the number of blocks. In most instances two or three areas were blocked for section. Only one hematoxylin and eosin stained section was examined in each case, except in selected cases in which more detailed examination was made for endocardial Aschoff bodies as will be indicated below. Reticulum and elastic-van Gieson stains were used to study some of the cases in which there were Aschoff bodies.

Chronic rheumatic pericarditis evidenced by fibrous thickening and lymphocytic infiltration was noted in 26 cases. This represented 20.3 per cent of the entire group, with no significant difference (21.7 per cent) in the smaller group (46 cases) in which there were endocardial Aschoff bodies.

Myocardial hypertrophy was present in almost all cases. Fibrosis of myocardium, usually perivascular, was present in 56.3 per cent of all the cases as compared to 70 per cent in the smaller group in which endocardial Aschoff bodies were present. Fine perivascular scarring or oval lesions suggestive of healed Aschoff bodies were uncommon. Cellular Aschoff bodies in the myocardium were observed in only three cases.

Endocardial Aschoff bodies were noted in 46 cases or 35.9 per cent of the total group. In 34 of these cases the Aschoff lesions were found in a single random section of from one to three areas of the appendage. The number varied from only a few to as many as several per low-power field. In 18

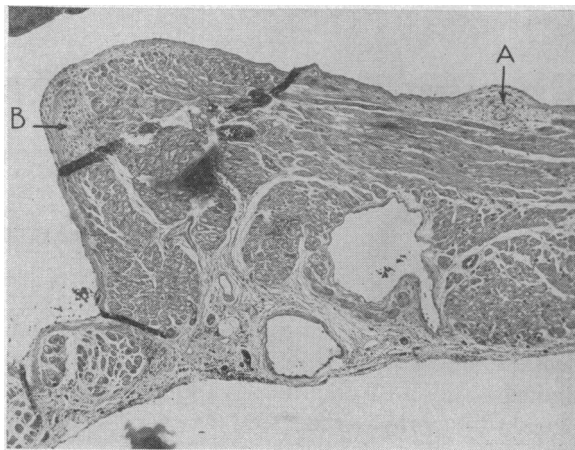


Figure 1.—Very low power view ($\times 50$) of wall of auricular appendage showing endocardial (A) and sub-endocardial Aschoff bodies (B).

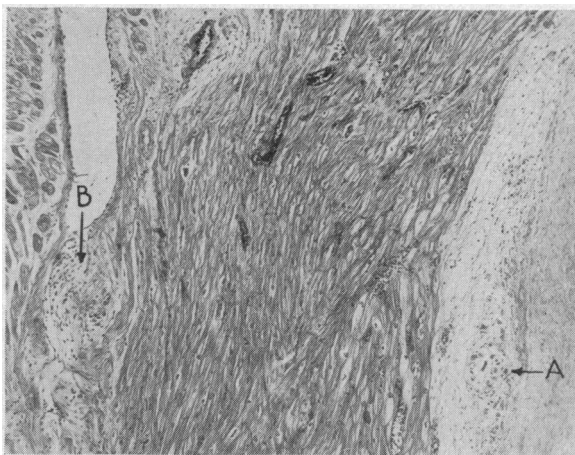


Figure 2.—Low power view ($\times 135$) showing Aschoff bodies in subendocardium (A) and in endocardial recess (B).

cases the presence of Aschoff bodies was at first considered doubtful because of slight or rare lesions in the single section first examined. In all these cases the specimens were recut, making three to six sections at different levels. This resulted in classifying ten cases as positive and eight as negative for Aschoff bodies.

In 18 cases in which the original single section was negative for Aschoff bodies the specimen was recut in similar fashion and Aschoff bodies were found in two of them. The remaining "negative" cases were not further studied.

The Aschoff bodies found on the endocardium or subendocardium were morphologically similar to those in other reported series. They were mostly of reticular and mosaic types. Most of the cells present in the lesion were mononuclear, showing considerable variation in nuclear and cytoplasmic structure. Although cells with ragged borders were common,

typical "owl-eyed nuclei" with chromatin radiating from vesicular centers, were uncommon. Some multinucleated cells were present. Leukocytes were infrequent. Although muscle fibers focally occur in the endocardium of the auricular appendage, the appearance of the lesions did not suggest origin from muscle cells. Both reticulum and collagen fibers were found in the lesions. Fibrinoid degeneration of collagen, or coronal arrangement of lesions, were not noted. Older lesions of the fibrillary type were rarely observed.

Mural thrombosis was noted in 60 of the 128 cases. It occurred in 30.4 per cent of the cases showing Aschoff bodies as compared to 46.4 per cent of the entire group. This lower incidence in cases showing Aschoff bodies has been noted in other reports.

Auricular fibrillation which was present in 70 of 125 cases, was, as expected, more common in the group showing mural thrombosis.

Seven of the 128 patients died in the immediate postoperative period, and autopsy was done in six of these. The major cause of death was cerebral embolism (four cases, one not autopsied), embolism to the superior mesenteric artery (one case), emboli to kidney and lower extremities (one case) and acute cardiac failure from surgically severed chorda tendineae (one case). Postmortem examination of the heart showed no Aschoff bodies in any of these six cases. However, in only one of them had Aschoff bodies been observed in the surgically removed auricular appendage. In one of the cases severe subacute focal interstitial myocarditis was noted, not definitely rheumatic in type. Another showed several fibrous myocardial nodules and fine perivascular fibrosis suggestive of chronic rheumatic myocarditis.

DISCUSSION

The pathological changes observed in the present group of cases were similar to those previously reported in the literature, including the presence of a fairly high incidence of endocardial Aschoff bodies. Most observers agree that the Aschoff body is indicative of active rheumatic disease. Hall, in Anderson's Textbook of Pathology (1st edition),² cited reports of an incidence of 32 to 87 per cent Aschoff bodies in acute and subacute rheumatic infections, and of 13 to 50 per cent in the hearts of subjects with healed valvular lesions. This wide variation in reported incidence is probably due to such modifying factors as variation in sites and amount of cardiac tissue studied, histological criteria of different observers, age groups studied, and geographical variations in incidence of rheumatic fever. One might expect a lower incidence of Aschoff bodies in

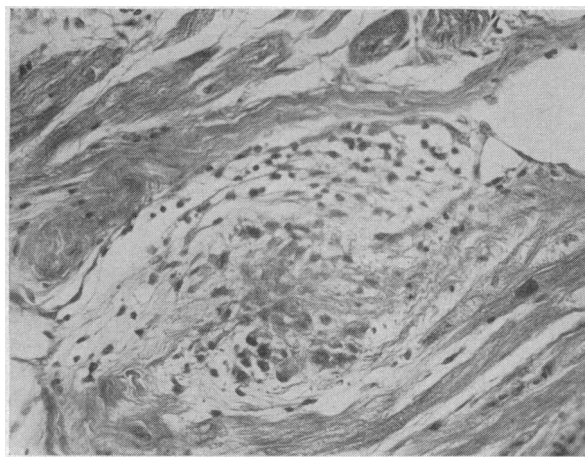


Figure 3.—High power view ($\times 290$) of Aschoff body in endocardial recess.

Southern California because of the presumed lower incidence of rheumatic fever and active rheumatic carditis. However, Hall and co-workers,² reported Aschoff bodies in the myocardium observed at autopsy in approximately 50 per cent of subjects who had aortic stenosis.

The left atrial appendage had not been systematically studied until attention was focused on it by the chance circumstance of the development of the mitral commissurotomy procedure. The study of Thomas and co-workers gave important information on this score. They made a retrospective study of the atrial appendage of the hearts of 40 patients who died of fulminating rheumatic fever and noted Aschoff bodies in the endocardium of the left atrium in 72 per cent of the 40 cases studied as compared to 85 per cent in other portions of the heart. In histological appearance these lesions were identical with those encountered in the surgical specimens. The atrial myocardium in both surgical and autopsy cases showed only rare involvement. Thomas was satisfied that these findings were evidence of rheumatic fever, even though the disease was not suspected clinically, and further stated that about 25 per cent of the patients operated upon had clinical evidence of rheumatic activity in the postoperative state. Half of these patients had Aschoff lesions in the atrial appendage. Soloff and co-workers⁵ also reported similar incidence of reactivation of rheumatic fever following mitral commissurotomy. They found no correlation between the presence of Aschoff bodies and the occurrence of the postcommissurotomy syndrome. McNeely and co-workers³ reported observations similar to those of Thomas with regard to the incidence of Aschoff bodies in the left atrium, and also good correlation with findings elsewhere in the heart in the fatal cases. They were not as impressed with either the frequency of postopera-

**TABLE 1.—Incidence of Aschoff bodies by age and sex
(128 cases, 26 males, 102 females)**

Age	Aschoff Bodies Present		Aschoff Bodies Absent		Total
	Male	Female	Male	Female	
21-30.....	1	10	2	6	19
31-40.....	3	23	3	24	53
41-50.....	3	6	14	24	47
51-60.....	0	0	0	9	9
Total.....	7	39	19	63	128
Total number of males.....					26
Total number of males with Aschoff lesions.....					7
Per cent positive.....					27%
Total number of females.....					102
Females with Aschoff lesions.....					39
Per cent positive.....					38.2%
Total positive					35.9%

tive rheumatic activity or the significance of Aschoff bodies as indicative or prognostic of rheumatic activity. The major correlated factors noted by them were lower incidence of Aschoff bodies with auricular fibrillation and higher incidence in the younger age groups. This has been noted by others; it was strikingly illustrated in the report of Rothschild and co-workers,⁴ who noted progressive decrease in the incidence of evidence of active infection in rheumatic hearts, from 100 per cent in the first decade to none after age 70. Thus McNeely and co-workers noted Aschoff bodies in the surgically removed atrial appendage in 60 per cent of the patients between ages 20 and 40 years and in only 20 per cent in those over age 40. A similar preponderance in the

younger age groups was noted in the present series, as shown in Table 1.

As was previously indicated, active rheumatic carditis is a contraindication to mitral commissurotomy. In the present series of 128 cases, follow-up information as to evidence of rheumatic activity in the postoperative period was available in 53 patients and in only eight of them was there clinical evidence of postoperative rheumatic activity. In none of this small group were Aschoff bodies noted in the auricular appendage.

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